Testimony of Representative Edward J. Markey (D-MA)
Before the Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs
Tuesday, June 22, 2004

Chairman Ose, Ranking Member Tierney, and Members of the Subcommittee, I appreciate this opportunity to discuss the siting of Liquefied Natural Gas (LNG) Import Facilities, and I commend you for calling today's hearing.

Since 1976 I have represented the Seventh Congressional District, in which the Everett Distrigas LNG importation terminal is located. As a Member of the Energy and Commerce Committee and, more recently, the U.S. House Select Committee on Homeland Security, I have been deeply interested in issues relating to the security of the LNG facility in Everett, and the safety of the LNG carrier vessels that transport LNG to this facility.

I am also the author of the Pipeline Safety Act of 1979, the law that – among other things -- governs the standards issued by the Transportation Department regarding the siting of new LNG terminals. In my testimony, I would like to share with the Subcommittee what I consider to be the principal lessons I have learned from the Everett experience, and what it means for the siting of other LNG importation terminals around the country.

Background

First of all, let me begin by saying that I think that LNG is an important component of the energy supply of New England, and that it has great potential to help the nation meet its growing need for natural gas. As Federal Reserve Chairman Alan Greenspan noted in his testimony before the Energy and Commerce Committee, one notable difference between the oil and natural gas markets in the United States is that our nation is able to obtain access to global supplies of oil via tanker. In contrast, virtually all of our natural gas supply comes from either U.S. or Canadian resources delivered via pipeline. Only a small portion of our supply comes in via tanker in the form of LNG. Increasing LNG imports is therefore one important way to help address America's increasing demand for natural gas. Obtaining access to the global natural gas supply through LNG imports is also one way of helping to reduce the current volatility in the U.S. natural gas marketplace.

The question then is where is the most appropriate place for these facilities to be sited? I would suggest to the Subcommittee that this is an issue that the Congress already considered nearly 25 years ago, based in large part about public safety concerns surrounding the siting of the Distrigas facility in a densely populated urban area, and the inherent difficulties in trying to address the consequences of an accident or an act of sabotage at this type of facility. At that time, the Congress enacted a law, which I authored, which tried to learn from the Everett

experience by directing the Secretary of Transportation to consider the need for remote siting as part of the rules applicable to all new LNG importation terminals. The Secretary of Transportation, unfortunately, has chosen to largely ignore this law and has failed to comply with Congress' intent regarding what factors the Department needs to take into account in writing rules for the siting of new LNG facilities. This failure had little consequence for more than 25 years, as no new LNG importation terminals were being built. Today, however, with dozens of LNG terminals being proposed around the country, this failure can no longer be tolerated.

Key Issues

As I see it, there currently are four critical issues that need to be addressed at the federal level.

First, we need to have a much better scientific and technical assessment of the consequences of a terrorist attack against an LNG tanker or LNG terminal. Such a hazard assessment is needed to better inform federal siting decisions with respect to any new LNG terminals around the nation. It is also needed to better inform state and local emergency planning and response activities with respect to existing LNG facilities.

Second, we need help from both the federal government and the facility operator to defray the costs that local governments incur in securing LNG or other critical infrastructure facilities from a terrorist attack. While Distrigas provides some funding for this purpose today, and has taken other actions to facilitate the efforts of local law enforcement to secure the facility, I believe that federal support is needed to help ensure that local firefighters are given realistic training to deal with the types of large fires or explosions that could occur, that local police departments have the resources needed to help provide security during times of elevated Homeland Security alert status, and during LNG shipments.

Third, we need to get the Transportation Department to upgrade its LNG siting regulations to comply with the Congressional intent that all future LNG terminals be remotely sited, and demand that the Department stop merely incorporating the National Fire Protection Agency Standards into its siting rules.

Fourth, we need the Coast Guard to undertake a more thorough analysis of the safety of LNG tankers, including the issues of brittle fracture and insulation flammability.

Let me briefly discuss each issue and offer some recommendations to the Subcommittee for further action.

Consequences of an Attack

On page 15 of the memoirs of Richard Clark, the White House's former anti-terrorism czar, and a man who served in the Clinton Administration, the first Bush Administration, and the Reagan Administration there is a disturbing passage that describes one of the discussions he had on 9/11 with Admiral James Loy, then the Commandant of the Coast Guard, as follows:

> "Jim, you have a Captain in the Port in every harbor, right." He nodded. "Can they close the harbors? I don't want anything coming in and blowing up, like the LNG in Boston." After the Millennium Terrorist Alert we had learned that al Qaeda operatives had been infiltrating Boston by coming in on liquid natural gas tankers from Algeria. We had also learned that had one of the giant tankers blown up in the harbor, it would have wiped out downtown Boston.
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> "I have that authority." Loy turned and pointed at another admiral. "And I have just exercised it."

The fact that al Qaeda terrorists had come into Boston on LNG tankers was extremely disturbing to those of us who live near the Distrigas LNG facility, and it heightens the importance of ensuring that this facility, and others like it, are fully protected against terrorist attack. It also underscores the need for us to better understand the hazardous presented by such an attack. In recent months, numerous press reports have raised concerns about nature and adequacy of some of the hazard studies that were performed for the Distrigas facility shortly after the September 11th attacks.

In the fall of 2001, the Department of Energy commissioned a study by Quest Consultants, Inc. regarding public safety issues relating to the transportation of LNG to the Distrigas facility and the storage of LNG at the facility. Secretary of Transportation Mineta wrote me about the study on October 26, 2001, noting that:

> "Quest Consultants, Inc., has been hired by DOE [the Department of Energy] to perform studies related to security on vessels transporting LNG and on the onshore LNG storage tanks."

On page 10 Secretary Mineta indicated that:

> "Quest Consultants, an engineering firm, has been asked by DOE to perform a study to analyze the threat that could result from a five-meter diameter hole in an LNG tank on a vessel. Quest has performed some initial calculations to quantify the gas dispersion and fire scenarios that could follow a large release from the LNG storage tanks."

Also on page 10, Secretary Mineta further stated that in addition to actions undertaken by the Department of Transportation to enhance security at the Distrigas facility, it was his understanding that:

> "To improve security measures, DOE will work directly with the local law enforcement officials and Distrigas. MEMA [Massachusetts Emergency Management Agency] will review the studies performed by Quest and develop a plan of action. RSPA [the Department of Transportation's Research and Special Projects Administration] will be involved in the review of the onshore plant protection security features.

My office was subsequently provided with a copy of the Quest study. This Quest study, along with a study prepared for the facility operator by Lloyd's Register of Shipping, which my office was also provided, has been used by the federal government and the facility operator to

reassure the Commonwealth Massachusetts about the potential danger of a fire and explosion at or near the Distrigas facility, thereby allowing the facility to reopen.

Last fall, several press reports called the accuracy of these studies into question. For example, the Quest study focused on accidents in Boston's Outer Harbor, when the most troubling public safety threats could occur in the Inner Harbor. The methodology of the study has also been called into question by numerous experts. Even the author backed away from the study's findings and conclusions. According to an October 19, 2003 article in the Mobile Register quotes John Cornwell, the lead scientists on the Quest study of LNG fires, as stating:

> "Some of the modeling we did for DOE – in hindsight, we should have done a more complete paper. …I've learned you never write anything you don't want public. We violated our own rules on that score."

The Register article goes on to report that Mr. Cornwell did the Quest study on short notice and that he was believed that it would be employed in-house by federal agencies as one of several tools used to examine LNG fire scenarios. However, according to the Register article:

> "In Boston, the Quest study – which has never been published in scientific journals – was apparently used by the DOE to suggest that a terrorist attack on an LNG tanker would result in only limited damage immediately around the ship. In stark contrast, published scientific studies have suggested that an LNG fire could have disastrous consequences for densely populated neighborhoods around Boston Harbor."

An article in the Boston Herald further suggests that the Quest study also was used by the Coast Guard to justify the resumption of LNG shipments in the months after the September 11th attacks.

At the time these press reports first appears, Department of Energy officials were quoted as denying any connection to the Quest Study, stating that the Department "did not commission or release the study" and was "not involved" with the study in any way.

I wrote to the Department of Energy, the Department of Transportation, and the FERC about this study. In response, DOE acknowledged that it had commissioned the study, and reported that it had been used by DOE officials in a presentation to an interagency working group formed to assist Massachusetts following the September 11th attacks. FERC indicated that it had cited the Quest Study in the Environmental Impact Statements for four LNG terminals (The Trunkline LNG Expansion Project, the Elba Island Expansion Project, the Hackberry LNG Project, and the Freeport LNG project). DOT reported that it had used the Quest study "as a hazard assessment model that was applied specifically to the Distrigas facility" and that "the results were used to justify enhanced security procedures for vessels transporting LNG and the onshore LNG storage tanks.

All three agencies seem to have tacitly admitted the shortcomings of the Quest study in deciding to support additional LNG safety studies.

The FERC commissioned a study by ABS Consulting, which was recently released to widespread criticism from both the industry and independent experts. The ABS Study found the earlier Quest study to have several flaws, and did not recommend that it be used to analyze the consequences of a terrorist attack on an LNG tanker or terminal. While the FERC put the ABS study out for public comment, it has also indicated that it regards the ABS Study to be a final study and does not plan to request a formal peer review of this study or update it to take account of the comments that have been submitted. Both industry and expert commentary submitted to the FERC about the ABS Consulting study has been largely critical, nothing several flaws in its methodology and urging that it be peer reviewed before it is used. Despite this recommendation, FERC appears to have no plans to request a peer review of the ABS study, but has nonetheless cited the study in the Environmental Impact Statement for the Freeport LNG project. The Subcommittee may wish to ask the FERC about this.

I understand that the DOE has commissioned a study by the Sandia Laboratory, which is expected to be available later in the year. While I don't know what is in the Sandia Study, I can only hope that it is more thorough than the previous government-funded LNG hazard studies. I would suggest to the Subcommittee that if the EPA issued an environmental regulation based on studies with as many flaws or shortcomings at the Quest and ABS studies, the regulated industry would be in an uproar and we would be hearing complaints about "junk science" being used to justify new regulations. Here, when we are talking about a matter that directly affects public safety; Congress also needs to demand that the science be done right, that it be methodologically sound, and that it be subjected to peer review. I urge the Subcommittee to help ensure that this is done in the future.

LNG Carrier Vessel Vulnerabilities

A second issue that I would call to the Subcommittee's attention is the potential for a terrorist attack on an LNG carrier vessel to result in failure of the cargo containment systems. Earlier this year, my office received a copy of a letter that Professor Jerry Havens of the University of Arkansas had sent Secretary Ridge regarding potential LNG tanker vulnerabilities. The Department's response suggested that the concerns posed by Professor Havens regarding: 1) the susceptibility of the foam insulation used on LNG carrier vessels to fire; 2) the possibility of rupture of the LNG containment system; and, 3) the potential for vapor pressure in the ship's LNG tanks to be elevated to levels beyond the capacity of the relief valves are either unfounded or are already being adequately addressed.

I have written the Department to request further information about the Department's basis for reaching such conclusions, based on contradictory evidence which is readily available from the public record. Here are my concerns:

First, the Department alleges that "foam polystyrene insulation, cited by Professor Havens, is not used on LNG carriers precisely because it's susceptible to melting and deformation in a fire."

This statement appears to be inaccurate. The Finnish LNG vessel manufacturer, Kvaerner Masa-Yards, reports in a sales brochure that, "the majority of the world's present LNG

fleet, including those on order, incorporate the [the company's] Kvaerner Moss LNG tank design." This document goes on to state that "The design of the cargo tank insulation is based on panels made of expanded polystyrene." [Emphasis added]

A quick look at the Kvaerner Masa-Yard website confirms that polystyrene is still being used by the company for its LNG carrier vessels (see **http://www.masa-yards.fi/publications/pdf/LNG.pdf**). This publication describes the use of "inserts of very soft polystyrene for flexibility and fiberglass fibre reinforcement to absorb forces which are built up during the cooling down of the cargo tank."

I am also informed that many of the LNG carrier vessels that employ the so-called "membrane" design in their storage containers may also use foam insulation, and that some of these may have used polystyrene or materials with similar flammability characteristics.

The Japanese firm, Kawasaki Heavy Industries, Ltd., describes the "Kawasaki Panel System" and includes a description of the companies' use of polyurethane foam and phenolic resin foam in LNG carriers. The U.S. Coast Guard web site contains a Circular 8-80, issued in 1980, which warns of the flammability of polyurethane foam (see **http://www.uscg.mil/hq/g-m/nvic/8_80/n8-80.pdf**) , and the OHSA website contains a Hazard Information Bulletin issued in May 1989 which warns that "Rigid polyurethane and polyisocyanurate foams will, when ignited, burn rapidly and produce intense heat, dense smoke and gases which are irritating, flammable and/or toxic" (see **http://www.osha.gov/dts/hib/hib_data/hib19890510.html**).

In addition, I recently received a copy of an article, which is available from the GasTech web site (see **http://www.gastech.co.uk/page.cfm/Action=GasTechSearch/t=m**) entitled "Gas Carriers – Effects of Fire on the Cargo Containment System." The article discusses some rather disturbing scenarios involving what could happen in the event that a fire on an LNG carrier vessel compromised the insulation.

In light of this information, my staff contacted the Coast Guard last week to ask them to explain the basis for the Department's assertions. They were unaware of the documents I have just mentioned. I have therefore formally asked the Department to explain the basis for its statement indicating that polystyrene foam is not used on LNG carriers. I also requested that the Department report on whether other flammable insulating materials are used on such carrier vessels. I am extremely concerned that the Department does not appear to be taking this issue seriously, and I believe that the matter needs to be addressed in order for the public to have confidence that the federal government is taking every necessary step to address potential threats to public safety.

The Department told me that "the insulation on LNG carriers is a complex assembly of many layers" and that "each layer is tested for fire resistance, and its ability to stop the spread of a fire, before it can be used on LNG carriers in U.S. waters." I have several questions about this statement, which I would urge the Subcommittee to explore, including:

1. Who in the federal government tests the insulation on LNG carriers for fire resistance?

2. Who is responsible for determining whether this insulation is acceptable for use on LNG carrier vessels operating in US waters?
3. What are the standards used by the federal government for determining whether or not the insulating materials used on LNG carrier vessels are acceptable?
4. What hazard analysis has been done to examine what would happen in the event that a fire on an LNG carrier vessel ignited the insulation or otherwise compromised it?
5. Are older ships required to be retrofitted with new insulation if they use insulating materials, like polystyrene, which have now been determined to be highly flammable? If not, why not? If so, how does the federal government verify that this has occurred?
6. In light of the post-9/11 threat, is there any plan by the Department, or by the Coast Guard, to review the safety standards applicable to LNG carriers (including fire safety standards) to determine whether they need to be upgraded to better address the threat of sabotage or terrorist attack?

In its letter, the Department stated that "the relief valve capacity of LNG carriers is designed based upon exposure to fire." This statement appears to assume that the insulation will continue to function properly. My concern is that if the insulation should fail as the result of a fire, the relief valves would not be capable of handling the increased vapor pressure that would result, since they would not allow for a sufficient flow through the valves. Professor Havens, who you will hear from later today, has suggested that if this were to be the case, the vessels, which are designed for only a few pounds overpressure, would be endangered.

The Department further suggests that concerns about the brittle fracture problem have been anticipated by U.S. regulations, which "require the use of a special crack-arresting steel in strategic locations throughout the vessel's hull." However, she goes on to acknowledge that "both the U.S. and international standards for LNG carriers were developed with the potential consequences posed by conventional maritime risks such as groundings, collisions, and equipment failures in mind." The Department then goes on to say that in recognition of the "new risks now possible in our post 9/11 world, the United States and the international community have responded by implementing additional operational security measures" under U.S. law and international maritime codes. My question is this: How does adoption of additional operational security measures suffice to address an issue – brittle fracture -- that seems to go to the fundamental design of an LNG tanker? Might not terrorist threats require the use of additional measures to address the problem of brittle fracture of the ship's hull resulting from an LNG spill? I urge the Subcommittee to raises this question with the Department of Homeland Security and the Coast Guard when they testify later this afternoon.

Funding

Let me now turn to the third issue – that of funding. On February 3, 2004, I organized a letter to Homeland Security Secretary Ridge, which was signed by Senator Kerry, as well as Representatives Tierney, Frank, Capuano, Lynch, and Delahunt. Our letter urged the Department to maintain a "High", or Orange, Threat Level in Boston Harbor and Everett whenever Liquefied Natural Gas (LNG) tankers enter the Port of Boston to be offloaded at the

terminal in Everett. Because of the unique and significant security challenges associated with the Everett LNG facility, the letter also calls on the Department to retain the Orange designation for the LNG terminal, even when the national threat level is downgraded to indicate a lower risk of terrorist attack. Our letter also urged Secretary Ridge to maintain federal reimbursement of overtime and other supplemental funds that Everett and other communities in the vicinity of the LNG facility must spend to secure the LNG facility from terrorism during the arrival, docking and departure of the LNG tankers.

On February 9, 2004, the Department of Homeland Security told the Executive Office of Public Safety in Massachusetts the following email:

> "I am responding to your request about possible including of the LNG operations and facilities in Everett, Massachusetts, and the ongoing LNG tanker ship operations in Boston Harbor as critical assets warranting continued enhanced protective measures. At this time, we cannot make an exception to our list of critical infrastructures and these facilities would not be eligible for overtime funding similar to the funding covering approved sites in your state."

As you can imagine, our delegation was not pleased to learn of this decision to deny overtime funding for LNG security activities. During a February 12, 2004 hearing of the Homeland Security Committee, I asked Secretary Ridge a question about Everett's eligibility for reimbursement for LNG expenses. The Secretary indicated that communities like Everett, which have important infrastructure and are located near major cities, would be eligible to get some of federal Urban Area Security Initiative money. However, the Secretary did not respond to my direct question about the Department's decision to deny Everett and other communities overtime funding. While Distrigas does presently reimburse the Everett police department for costs directly attributable to providing increased security details for the LNG facility during periods when the LNG tanker is docked at the terminal and unloading its cargo. I would like to see additional funding provided to cover provision of a police security detail at the facility at all times, with an enhance presence during elevate Homeland Security Threat levels. I would also like to see additional funding for training of local firefighters in Boston, Everett, and other surrounding communities who may someday be called on to fight an LNG fire.

Need for a New DOT Rulemaking

Let me now turn to the fourth and final issue: DOT's failure to properly exercise its authorities over LNG siting. Under a provision of the Pipeline Safety Act 1979, the Secretary of Transportation is supposed to ensure that the siting of all new LNG terminals is subject to standards which consider: 1) the kind and use of the facility; 2) existing and projected population and demographic characteristics of the location; 3) existing and proposed land use near the location; 4) natural physical aspects of the location; 5) medical, law enforcement, and fire prevention capabilities near the location that can cope with a risk caused by the facility; and 6) the need to encourage remote siting (see 49 U.S.C. 60103).

I am concerned about the nature and adequacy of the Transportation Department's efforts to carry out this authority. In the Committee report accompanying the House Energy and

Commerce Committee's version of what became the Pipeline Safety Act of 1979 (H.Rept. 96-201, Part 1), the Committee noted:

> "One area of particular concern to the committee has been the failure to adopt comprehensive Federal standards regarding the sting, design, operation, and maintenance of liquefied natural gas facilities." In 1972, the industry consensus standards developed by the National Fire Protection Association were incorporated into the federal gas pipeline safety regulations, supposedly as an interim measure pending the development of comprehensive standards. Despite widespread concern over the adequacy of these interim standards and the growing importance of LNG as an energy source, the promised comprehensive standards have never been adopted. H.R. 51 addresses this problem by identifying the criteria to be considered by the Secretary in developing standards and setting firm deadlines for proposing and adopting them."

However, if you read the DOT regulations at 40 CFR Part 193, for example, you will find that the DOT's regulations still continue to largely incorporate by reference the National Fire Protection Association (NFPA) standards – specifically, NFPA Standard 59A.

Deputy Chief Joseph Flemming of Boston Fire Department, in his May 25, 2004 comments on the ABS Consulting Report, has raised some very serious concerns about the wisdom of continuing to rely on the NFPA standards. Deputy Chief Flemming notes, for example, that the NFPA standards call for preventing "thermal radiation flux from a fire from exceeding" certain limits. One of these limits is 1600 Btu's per hour. He notes that "this level of heat flux will cause 2nd degree burns in 30-40 seconds," that it "will cause severe pain in 13 seconds," and that it will "be fatal to 1% of the affected population in 50 seconds." Deputy Chief Flemming notes that the Society of Fire Protection Engineers Handbook recommends a level ½ of that allowable under the NFPA standard. Finally, he notes that the NFPA Committee that made up these standards is largely comprised of representatives of the LNG industry or energy industry consultants, and that public officials – including firefighters who may have to deal with an LNG fire, are not routinely brought into discussion about what the appropriate standards should be. A quick check of the NFPA website reveals that the NFPA LNG Committee has representatives from BP Amoco, Distrigas, ExxonMobil, Weaver's Cove Energy, Keyspan, the American Gas Association, the American Petroleum Institute, the American Concrete Institute, and the Steel Plate Fabricators Association.

I would urge the Subcommittee to ask the Transportation Department whether it intends to continue relying on the industry dominated NFPA standards for LNG fire safety, or whether it plans to issue new LNG standards in a public rulemaking that better take into consideration the science, the hazards, and the risks, and which better comports with Congressional intent that the Department -- not the NFPA -- issue the standards for LNG siting.

Shortly after enactment of the 1979 Act, changes in the natural gas market place resulting from the decontrol of natural gas wellhead prices lead to the withdrawal of proposals for new LNG terminals and the shut down of all but the Everett, Massachusetts terminal. In a period when no new LNG terminals were being built, and existing ones were being shuttered, it is perhaps understandable that DOT did not take action to replace the NFPA standards with

standards of its own. However, given the current resurgence of interest in LNG and the flood of new proposals to build LNG terminals, I think that DOT needs to revisit this matter now and consider revising its standards. I would also note that FERC has the legal authority to impose additional standards for LNG terminals. If DOT fails to Act, perhaps it is time for FERC to do so.

Conclusion

Since the September 11th terrorist attacks, Everett and other communities surrounding the Distrigas LNG facility have invested substantial amounts of money and time to ensure that the LNG facility receives the highest levels of protection possible. These comprehensive security measures are costly, and the federal government needs to do its part to help ensure the safety of these facilities.

Looking to the future, LNG is likely to become an increasing part of our energy mix. Given that fact, Congress needs to ensure that the federal government takes further steps to ensure that any future LNG terminals are sited in locations that prevent them from becoming an attractive terrorist target. Adhering to the Congressional directive that the Secretary consider the need for remote siting, looking at offshore siting alternatives, and updating the LNG siting rules so that they reflect sound science and decisions by federal agencies – as opposed to industry self regulatory bodies – is desperately needed. Finally, a more thorough examination of the potential consequences of a terrorist attack on an LNG tanker needs to be done. Perhaps the Sandia study will address this issue, but based on my experiences with the previous Quest and ABS Consulting studies, I think that the Congress needs to step up oversight in this area and demand that the studies that are being funded by the federal government are scientifically sound and subjected to a full peer review.

Thank you, Mr. Chairman for your invitation to submit this testimony. I look forward to working with you and other Members of the Committee on this and other important homeland security matters.